# DEVELOPMENT OF IMPACT TEST DEVICE

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## SUPERVISOR'S DECLARATION

I hereby declare that I have checked this project and in my opinion this project is satisfactory in terms of scope and quality for the award of Diploma in Mechanical Engineering

Signature

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Date: 16 DECEMBER 2009

## STUDENT'S DECLARATION

I hereby declare that the work in this report is my own except for quotations and summaries which have been duly acknowledged. The report has not been accepted for any diploma and is not concurrently submitted for award of other diploma.

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## ABSTRACT

The objective of this project is to design and fabricate impact test device for ITS model. In Panasonic not have the suitable tester for impact test, so this project to make specific device test. This tester for KX-TS500 only with can adjust the height and width and the load of impact test is depends the weight of steel ball 1kg or equivalent. Before fabricate the impact test, on researches about drilling and welding. To get the suitable concept must have another concept and choose the best concept with some criteria. Finally, the best concept as a final concept. Choose the suitable material with have long life time. It have many work to fabricate the product such as measuring, cutting, drilling, and finally is painting to avoid the product become corrosion. To running this tester must have the procedure to avoid any accident. The purpose of this project is to know the condition of surface. If the surface is crack, so the strength of surface is not enoughly to produce the model.

## ABSTRAK

Objektif projek ini adalah untuk melukis dan membuat ujian hentaman untuk *integrated telephone system* (ITS). Di panasonic tidak mempunyai alat yang sesuai untuk membuat ujian hentaman, jadi projek ini membuat satu alat spesifikasi untuk dijadikan alat hentaman. Ujian ini hanya digunakan untuk model panasonic KX-TS500 yang boleh dilaraskan ketinggian dan panjang dan berat untuk bebola besi biasanya 1 kilogram atau sama dengannya. Sebelum membuat ujian hentaman, satu kajian perlu dilakukan saperti penebukkan dan pencanuman bahan. Untuk mendapat satu konsep yang sesuai memerlukan beberapa konsep dan memilih konsep terbaik dengan beberapa kriteria. Akhir sekali konsep terbaik akan menjadi konsep yg utama. Kemudian memilih bahan yang sesuai untuk dijadikan sebagai bahan membuat produk yang mempunyai jangka hayat yang lama. Beberapa kerja perlu dilakukan saperti mengukur, memotong, menebuk lubang dan akhir sekali ialah mengecat produk untuk mengelakkan daripada karat. Untuk menjalankan proses ujian hentaman ini perlu kepada prosedur agar sebarang kemalangan tidak berlaku. Tujuan produk ini adalah untuk mengetahui keadaan permukaan. Jika keadaan retak, maka kekuatan permukaan masih tidak bagus untuk dipasarkan.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| CAD | Computer Aided Design |
| FYP | Final Year Project |
| GMAW | Gas Metal Arc Welding |
| ITS | Integrated Telephone System |
| MIG | Metal Inert Gas |
| SOP | Standard Operation Procedure |

# CHAPTER 1

# INTRODUCTION

## 1.0 INTRODUCTION

This chapter explained about the project statement, project objective, project scope that been conducted. Besides that, this chapter also covers project flow and the progress project are follows the flow chart and gantt chart duration of time.

## 1.1 PROBLEM STATEMENT

This project is to design a test device for the Integrated Telephone System (ITS) product. The device is specializing to conduct the Impact test for ITS product.

## 1.2 OBJECTIVE

The objective of this project is to design and fabricate impact test device for ITS model.

## 1.3 SCOPE

The scopes for this project are:

1.4.1 This test is only for Panasonic KX-TS500 model

1.4.2 The adjustable height for impact test is within range of 1mm until 200mm

1.4.3 The adjustable width for impact test is within range of 1mm until 150mm

1.4.4 The load of impact test is depends the weight of steel ball 1kg or equivalent.

## 1.4 PROCESS PLANNING

Figure 1.1 shows the flow chart for this project. Its shows start to the end of this project sequences.

The first is deciding the project title. This being done through discussion and consultation with project supervisor. Among the item discussed are suitable objective and scope for this project and method to conduct the project. Then, the literature review being done to guiding this project.

After the main problem was identified, the conceptual design has been generated to get the best idea for this project. The best concept has been selected for the final design.

After choosing the final design, fabrication process gets started. Fabricate must same as the final design drawing. All the material uses must defined early to ensure that the material is available in mechanical lab.

As the project goes through, closed supervision by supervisor is important in order to sustain the improvement proposal. The best solution which will give better improvement result will be proposed this project.

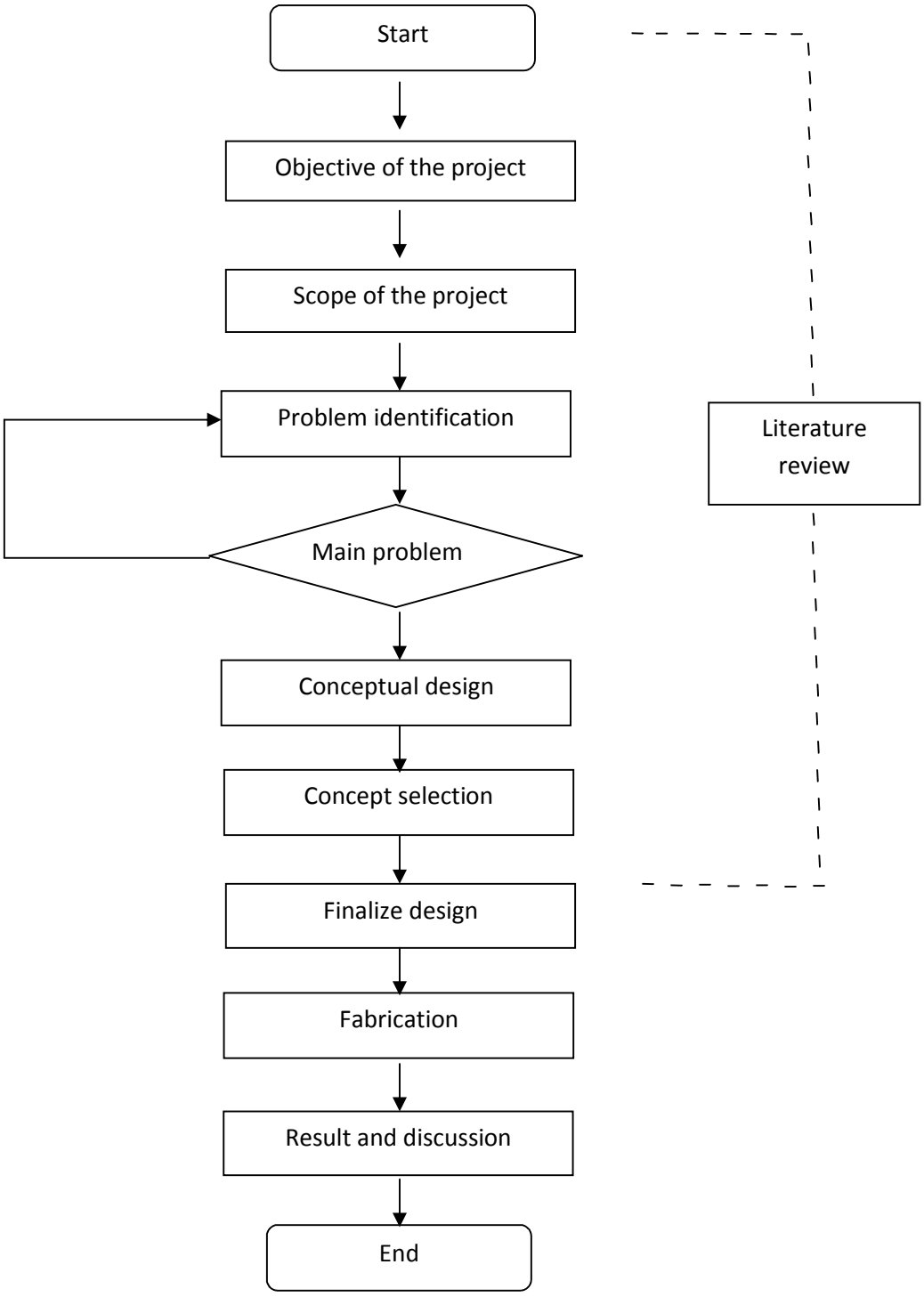


**Figure 1.1**:Project Flow Chart

Figure 1.2 below show that Gantt chart for the FYP of this project, respectively. It also show the duration of time needed for each task that carried out during the study.

| ID | TASK | | WEEK | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 1 | Title Confirmation | Plan | | | | | | | | | | | | | | |
| | | Actual | | | | | | | | | | | | | | |
| 2 | Literature Review | Plan | | | | | | | | | | | | | | |
| | | Actual | | | | | | | | | | | | | | |
| 3 | Find design | Plan | | | | | | | | | | | | | | |
| | | Actual | | | | | | | | | | | | | | |
| 4 | Drawing 2D | Plan | | | | | | | | | | | | | | |
| | | Actual | | | | | | | | | | | | | | |
| 5 | Drawing 3D | Plan | | | | | | | | | | | | | | |
| | | Actual | | | | | | | | | | | | | | |
| 6 | Prepare for mid Presentation | Plan | | | | | | | | | | | | | | |
| | | Actual | | | | | | | | | | | | | | |
| 7 | Mid Presentation | Plan | | | | | | | | | | | | | | |
| | | Actual | | | | | | | | | | | | | | |
| 8 | Fabricate | Plan | | | | | | | | | | | | | | |
| | | Actual | | | | | | | | | | | | | | |
| 9 | Prepare for final Presentation | Plan | | | | | | | | | | | | | | |
| | | Actual | | | | | | | | | | | | | | |
| 10 | Make report | Plan | | | | | | | | | | | | | | |
| | | Actual | | | | | | | | | | | | | | |
| 11 | Final Presentation | Plan | | | | | | | | | | | | | | |
| | | Actual | | | | | | | | | | | | | | |

**Figure 1.2**:FYP Gantt chart

Base on the Gantt chart, title has been confirmation with supervisor and literature review has been find until week eight. To find design planning is from first week until week five but in the first week have a problem to know the purpose of this project..

Drawing 2D was planning after find the design from week five until week six but have a problem in week five because to learn about autoCAD to make a design. The drawing 3D was planning from week five until week eight and also late one week because to learn about autoCAD to make 3D design.

In week seven until week eight to prepare for mid presentation and mid presentation start in week eight. After mid presentation, the fabrication process is continued until week fourteen and planning for prepare for final presentation is week twelve until week fourteen but in the week twelve the fabrication is not complete.

To make the report is planning week nine until week fourteen but have a problem in week nine because the fabrication process not be done. And final design is held in week fourteen.

## 1.5 PROJECT REPORT ARRANGEMENT

CHAPTER 1 is the introduction chapter for this project. Its generally discuss about the project background, the objective and scope and the project flow. Beside that, it tells about the flow of this project.

CHAPTER 2 is the literature review of this project. This chapter will explain about the research of the project that has been chosen and explained about Panasonic phone KX-TS500. It also tells about the impact and button strength test and its equipment for this test.

CHAPTER 3 is the design concept and selection of this project. Its discuses about the data and information for get design. This chapter explain about to get the final design by using concept variants

CHAPTER 4 is the fabrication process. It explain about to fabricate the product based on the final design and it consists the material selection

CHAPTER 5 is the result and discussion. It explain about operating procedure to run the product and also discuss about the problem during fabrication process.

CHAPTER 6 is the last chapter for this project report. It covers the overall result of this project. Besides that, this project is the new design because in Panasonic companies not have the device test and a few suggestions for further study in the future to increase the productivity of this company.

## 1.6 CONCLUSION

For this chapter, we can conclude this chapter can clear about the objective and do the project easily. In Panasonic companies not have the specific device test, so this project is to design and fabricate the new device test. In conducting a project like this project, well arrangement of works is really important to keep the momentum of this study.

# CHAPTER 2

# LITERATURE REVIEW

## 2.0 INTRODUCTION

This chapter will explain about the research of the project that has been chosen and explained about Panasonic phone KX-TS500 features and specification. It also tell about the impact and button strength test. This chapter also shows the project concept from gear concept and spring concept.

## 2.1 PANASONIC KX-TS500

The KX-TS500 from Panasonic is a basic corded phone designed for users who don't need a lot of bells and whistles. A corded phone with single line operation, the KX-TS500 is call waiting compatible (requires a subscription) and requires no batteries to operate. Handset and ringer volume controls allow you to adjust levels to your liking, and you can switch between tone and pulse dialing modes. A redial button lets you quickly dial the last outgoing number, while the flash button provides access to call waiting. The KX-TS500 is wall-mountable, allowing you to keep countertop space free from unnecessary clutter [1]. The table 2.1 shown the specification of the KX-TS500 model.

| Specifications | Ability |
|---|---|
| Dial Mode | Tone / pulse |
| Redial | One-touch (32 digits) |
| Flash 600 ms | 600 ms |
| Power Source | Telephone line |
| Dimensions (H x W x D) | 96 mm x 150 mm x 200 mm |
| Weight | 475 g |
| Phone type | Corded |
| Call waiting capability | Yes |
| Distinctive ring | No |
| Voice mail message indicator | No |
| Integrated answering system | No |
| Speakerphone | No |
| Number of lines | 1 |
| One touch dialer | No |
| Emergency dialer | No |
| Speed dial | No |
| Data port | No |
| Multi-user expandable | No |
| Handset volume | Yes |
| Ringer indicator lamp | No |
| 3-way conferencing | No |
| Headset compatible | No |
| Local call mode | No |
| Flash | Yes |
| Redial | Yes |
| Pause | No |
| Hold | No |
| Mute | No |
| Call transfer | No |
| Intercom | No |
| Wall mountable | Yes |
| Tone/pulse dialing | Yes |
| Hearing aid compatible | Information not available |

**Table 2.1:** Specification of Panasonic KX-TS500

## 2.2 IMPACT TEST

Impact is a high force or shock applied over a short time period. Such a force or acceleration can sometimes have a greater effect than a lower force applied over a proportionally longer time period. At normal speeds, during a perfectly inelastic collision, an object struck by a projectile will deform, and this deformation will absorb most, or even all, of the force of the collision. Viewed from the conservation of energy perspective, the kinetic energy of the projectile is changed into heat and sound energy, as a result of the deformations and vibrations induced in the struck object. However, these deformations and vibrations can not occur instantaneously. A high velocity collision (an impact) does not provide sufficient time for these deformations and vibrations to occur. Thus, the struck material behaves as if it were more brittle than it is, and the majority of the applied force goes into fracturing the material [2].

## 2.3 JOINING METHOD

Joining involves in assembly stage. Commonly used method to join metal part is Metal Inert Gas (MIG) welding such as in figure 2.1


**Figure 2.1:** Metal Inert Gas (MIG) Welding

Sources: Wikipedia, Metal Inert Gas (MIG) Welding

MIG (Metal Inert Gas) or as it even is called GMAW (Gas Metal Arc Welding) uses an aluminum alloy wire as a combined electrode and filler material. The filler metal is added continuously and welding without filler-material is therefore not possible. Since all welding parameters are controlled by the welding machine, the process is also called semi-automatic welding.

The MIG-process uses a direct current power source, with the electrode positive. By using a positive electrode, the oxide layer is efficiently removed from the aluminum surface, which is essential for avoiding lack of fusion and oxide inclusions. The metal is transferred from the filler wire to the weld bead by magnetic forces as small droplets, spray transfer.

There are two different MIG-welding processes, conventional MIG and pulsed MIG. For the conventional MIG uses a constant voltage power source. Since the spray transfer is limited to a certain range of arc current, the conventional MIG process has a lower limit of arc current (or heat input). This also limits the application of conventional MIG to weld material thicknesses above 4 mm. Below 6 mm it is recommended that backing is used to control the weld bead.

For the pulsed MIG uses a power source with superimposed periodic pulses of high current. During the low current level the arc is maintained without metal transfer. During the high current pulses the metal is transferred in the spray mode. In this way pulsed MIG is possible to operate with lower average current and heat input compared to conventional MIG. This makes it possible to weld thinner sections and weld much easily in difficult welding positions [3].

## 2.4 DRILLING

Drilling is easily the most common machining process. One estimate is that 75% of all metal-cutting material removed comes from drilling operations. Drilling involves the creation of holes that are right circular cylinders. This is accomplished most typically by using a twist drill, something most readers will have seen before. The chips must exit through the flutes to the outside of the tool. As can be seen in the figure, the cutting front is embedded within the work piece, making cooling difficult. The cutting area can be flooded, coolant spray mist can be applied, or coolant can be delivered through the drill bit shaft.

A typical manual drill press is shown in the figure 2.2. Compared to other powered metal cutting tools, a drill press is fairly simple, but it has evolved into a versatile necessity for every machine shop [4].

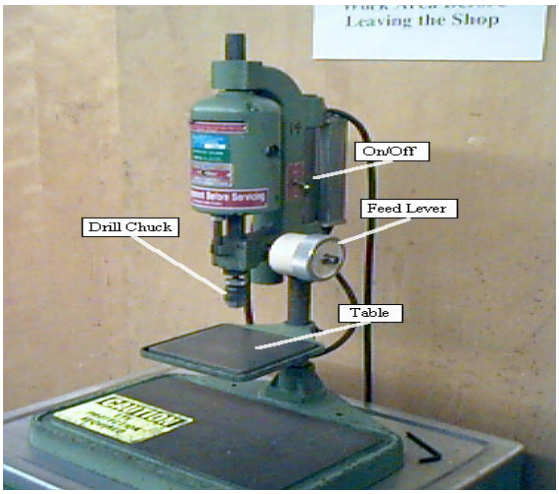


**Figure 2.2:** Drill Press Machine

Sources: Engineering Dartmouth, Drill Press Machine (2004)